US010293737B2

(12) **United States Patent**
Granell Peniche et al.

(10) **Patent No.: US 10,293,737 B2**
(45) **Date of Patent: May 21, 2019**

(54) **MODULAR TRUNK SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 168 days.

(21) Appl. No.: **15/171,241**

(22) Filed: **Jun. 2, 2016**

(65) **Prior Publication Data**

US 2017/0349077 A1 Dec. 7, 2017

(51) **Int. Cl.**

B60P 3/06	(2006.01)
B60R 5/04	(2006.01)
B60R 7/02	(2006.01)
B62B 3/02	(2006.01)
B62B 5/00	(2006.01)

(52) **U.S. Cl.**

CPC ***B60P 3/06*** (2013.01); ***B60R 5/04*** (2013.01); ***B60R 7/02*** (2013.01); ***B62B 3/025*** (2013.01); ***B62B 3/027*** (2013.01); ***B62B 5/0003*** (2013.01)

(58) **Field of Classification Search**

CPC B60P 3/06; B60R 5/04; B60R 7/02
USPC 296/37.1, 37.14
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,094,401	A *	9/1937	Girl	B60R 5/04 224/42.32
5,056,846	A *	10/1991	Tanaka	B60R 5/04 292/83
6,338,518	B1	1/2002	D'Annunzio et al.	
6,926,348	B2 *	8/2005	Krueger	B60R 5/04 224/403
8,602,467	B2	12/2013	Lee et al.	
9,440,594	B1 *	9/2016	Clamont Bello	B60R 5/04
2005/0179269	A1	8/2005	Weiland	

FOREIGN PATENT DOCUMENTS

CA	2715762	A1	3/2012
DE	19956743	A1	5/2001

* cited by examiner

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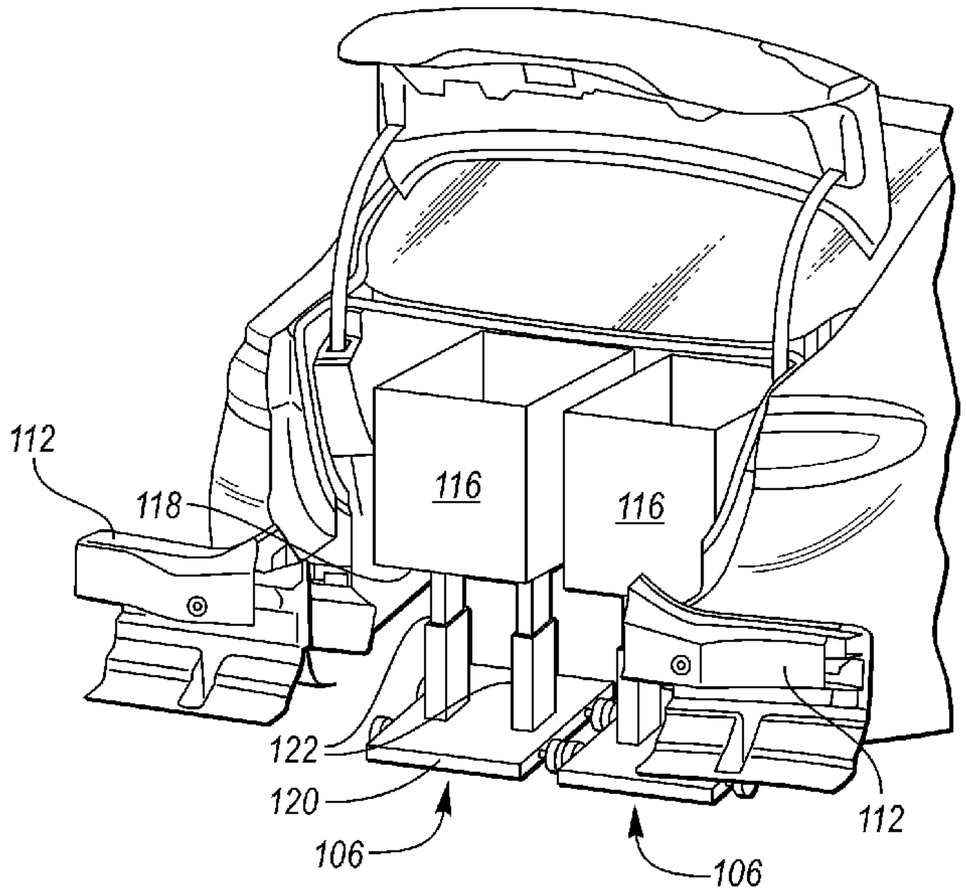
(57) **ABSTRACT**

A vehicle trunk storage system may include a vehicle trunk having a trunk floor defining an opening and a lip extending around the opening, and a cart including a compartment and a wheeled base, wherein the lip is configured to receive a bottom of the compartment of the cart within the trunk.

10 Claims, 4 Drawing Sheets



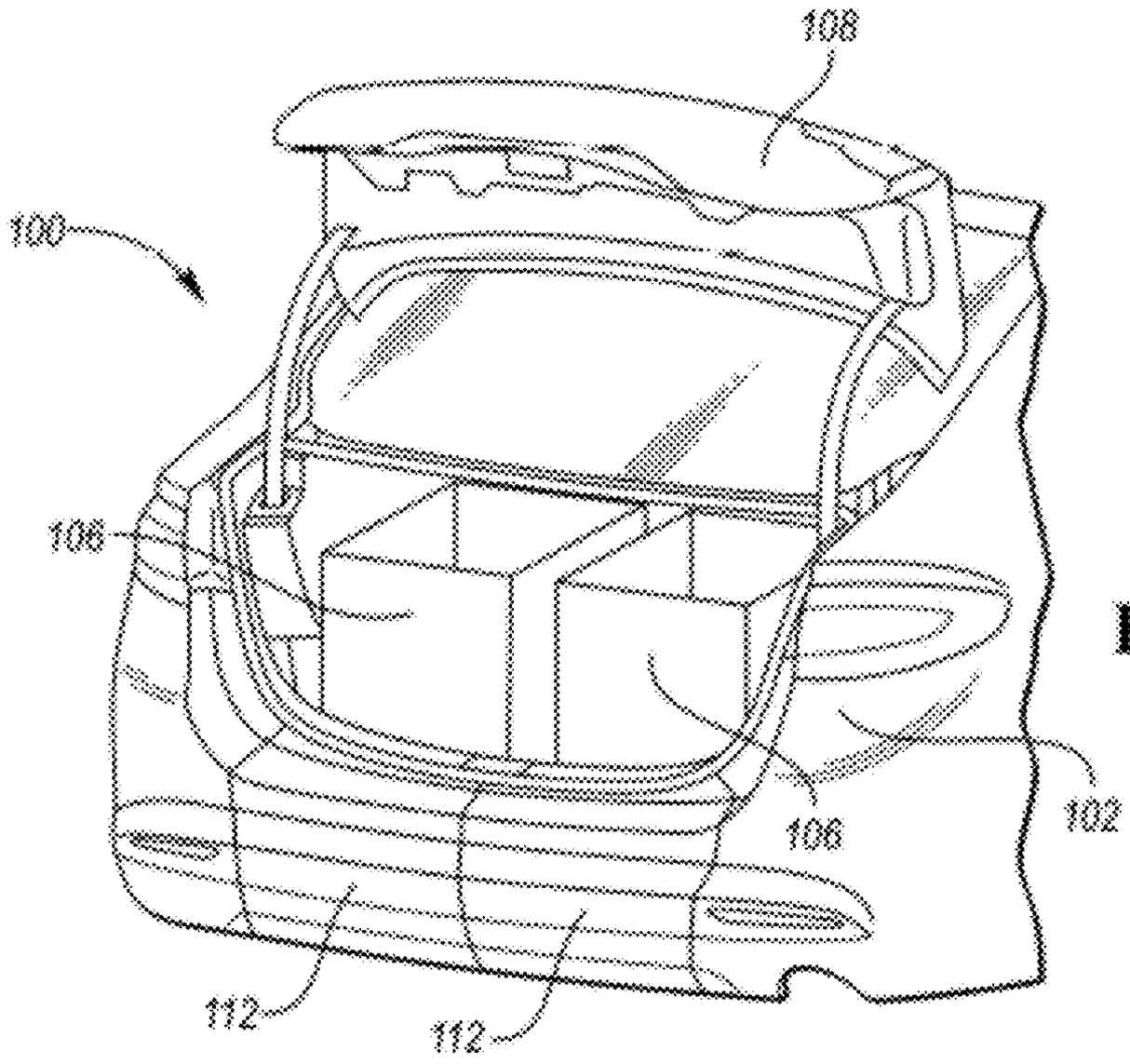

108
100
108
106
102
112
112

FIG. 1

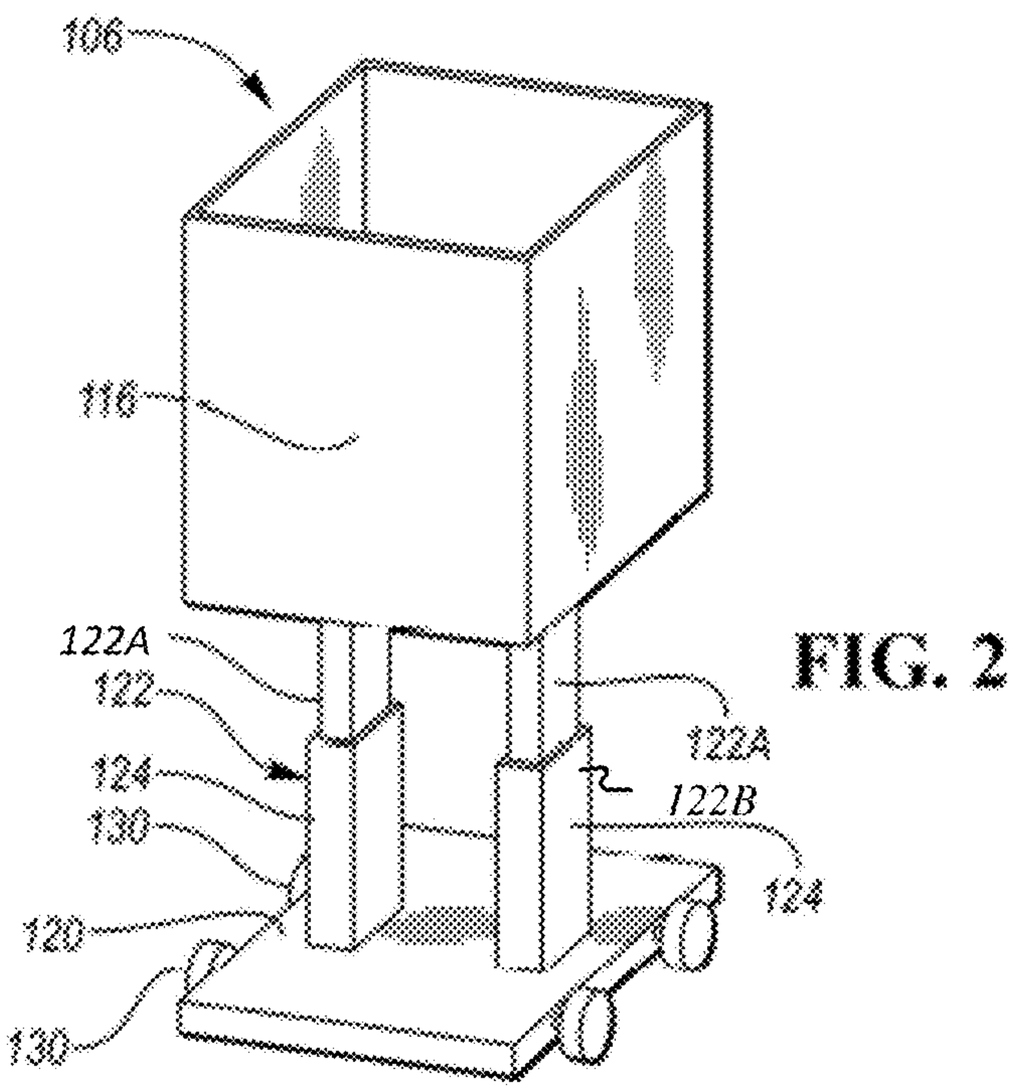
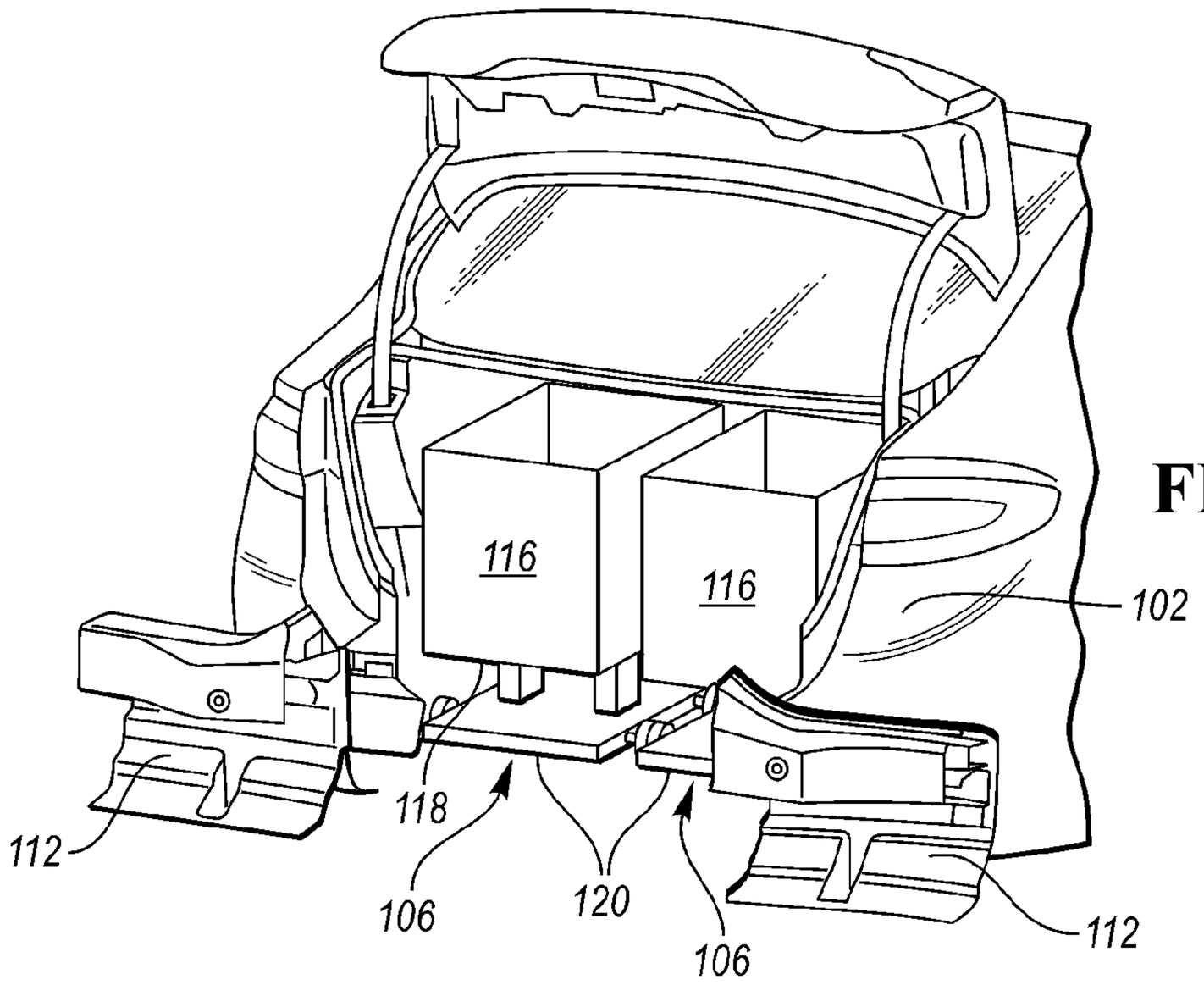

106
116
122A
122
124
130
120
130
122A
122B
124

FIG. 2


116
116
102
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118
106
120
106
112

FIG. 3

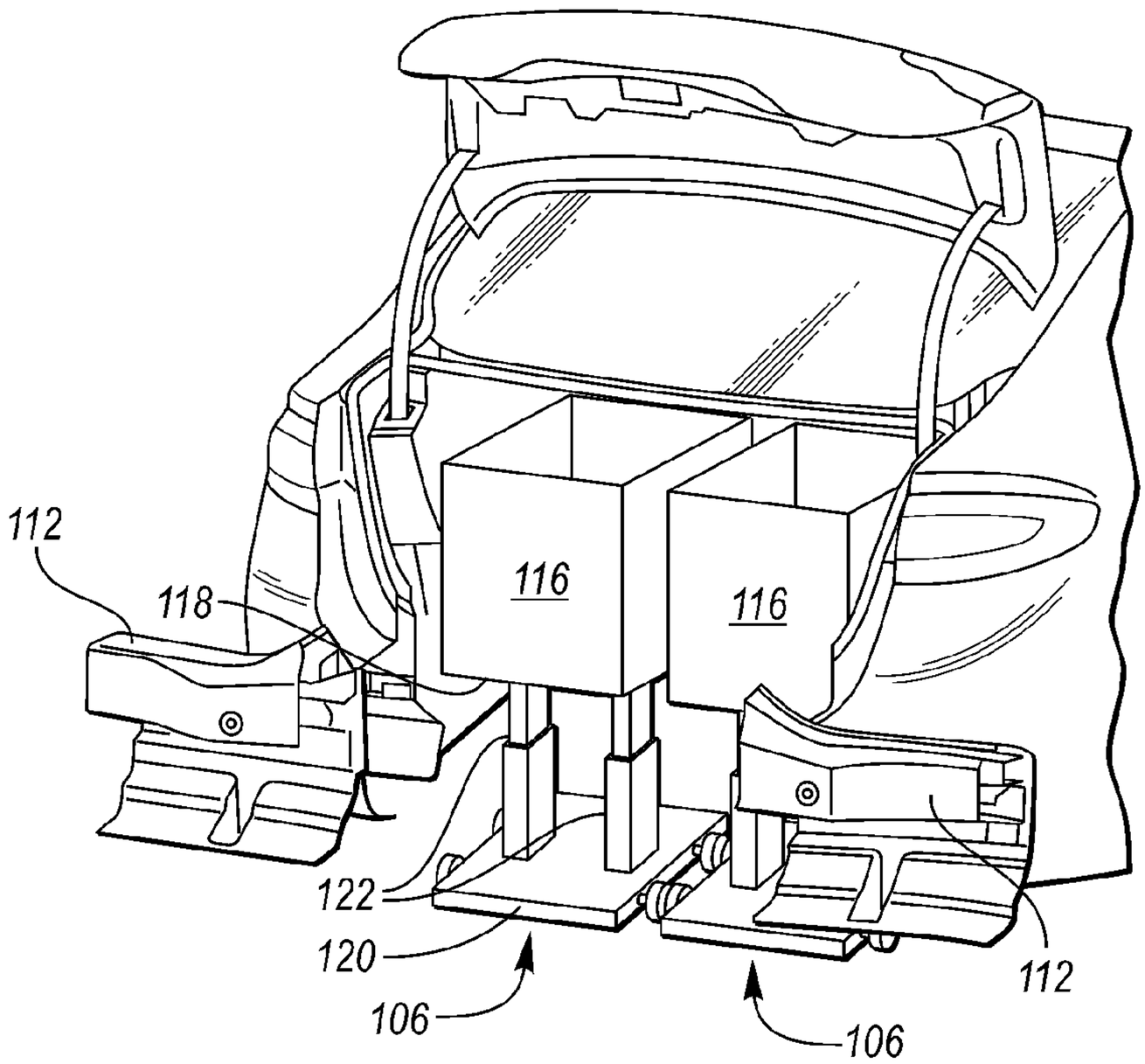
112
118
116
116
122
120
106
106
112

FIG. 4

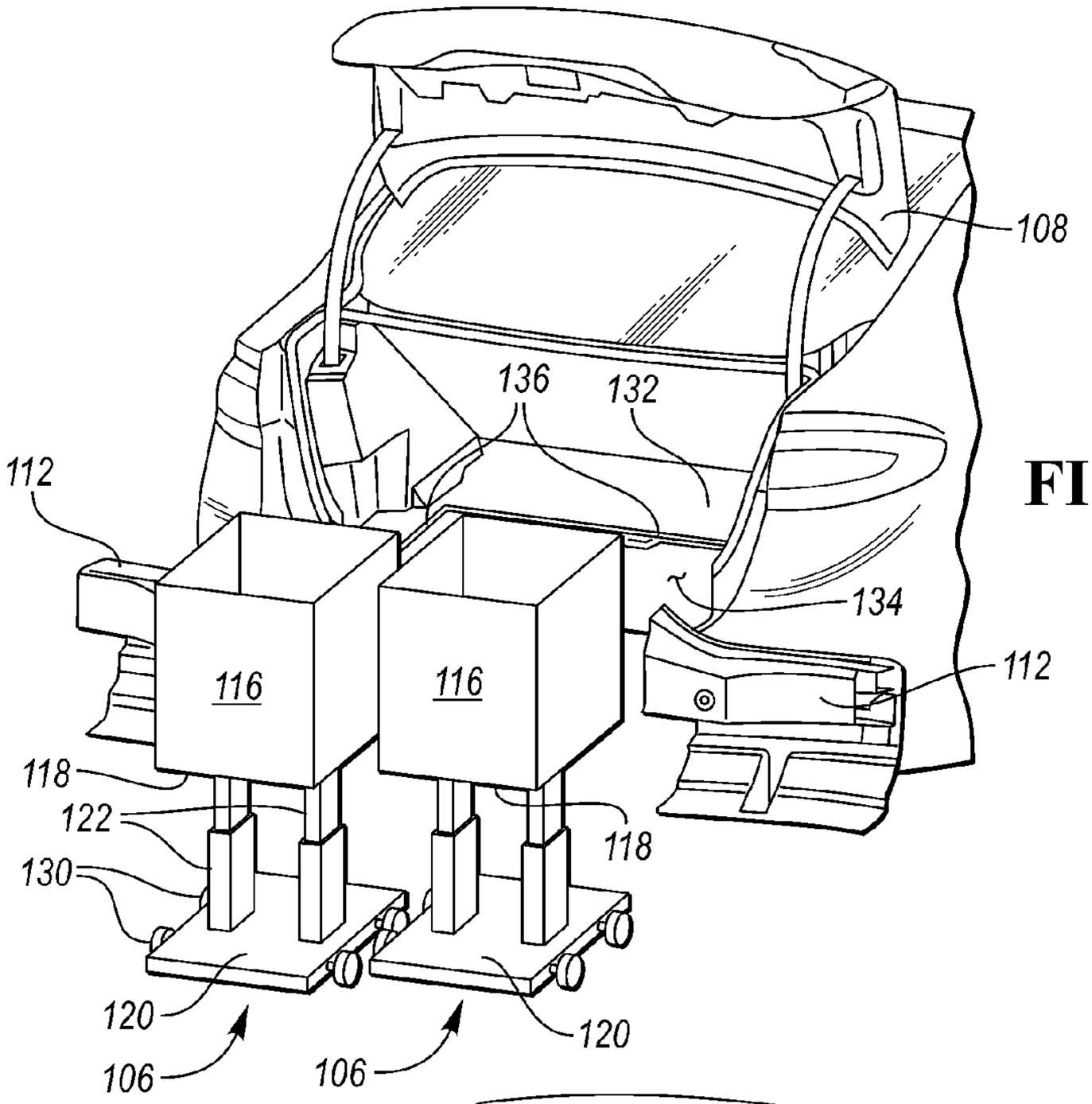
108
136
132
112
134
112
116
116
118
122
130
118
120
120
106
106

FIG. 5

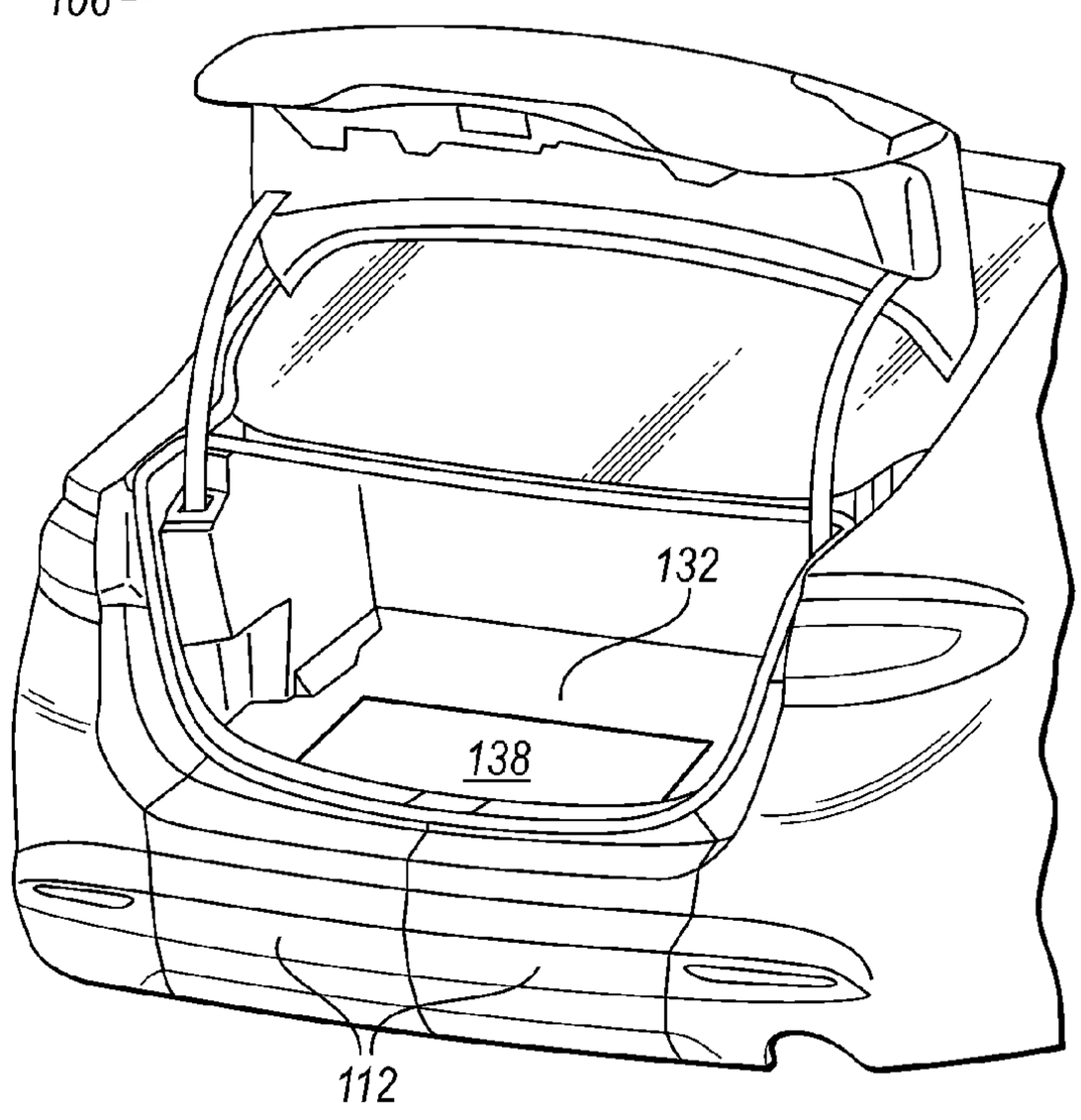
132
138
112

FIG. 6

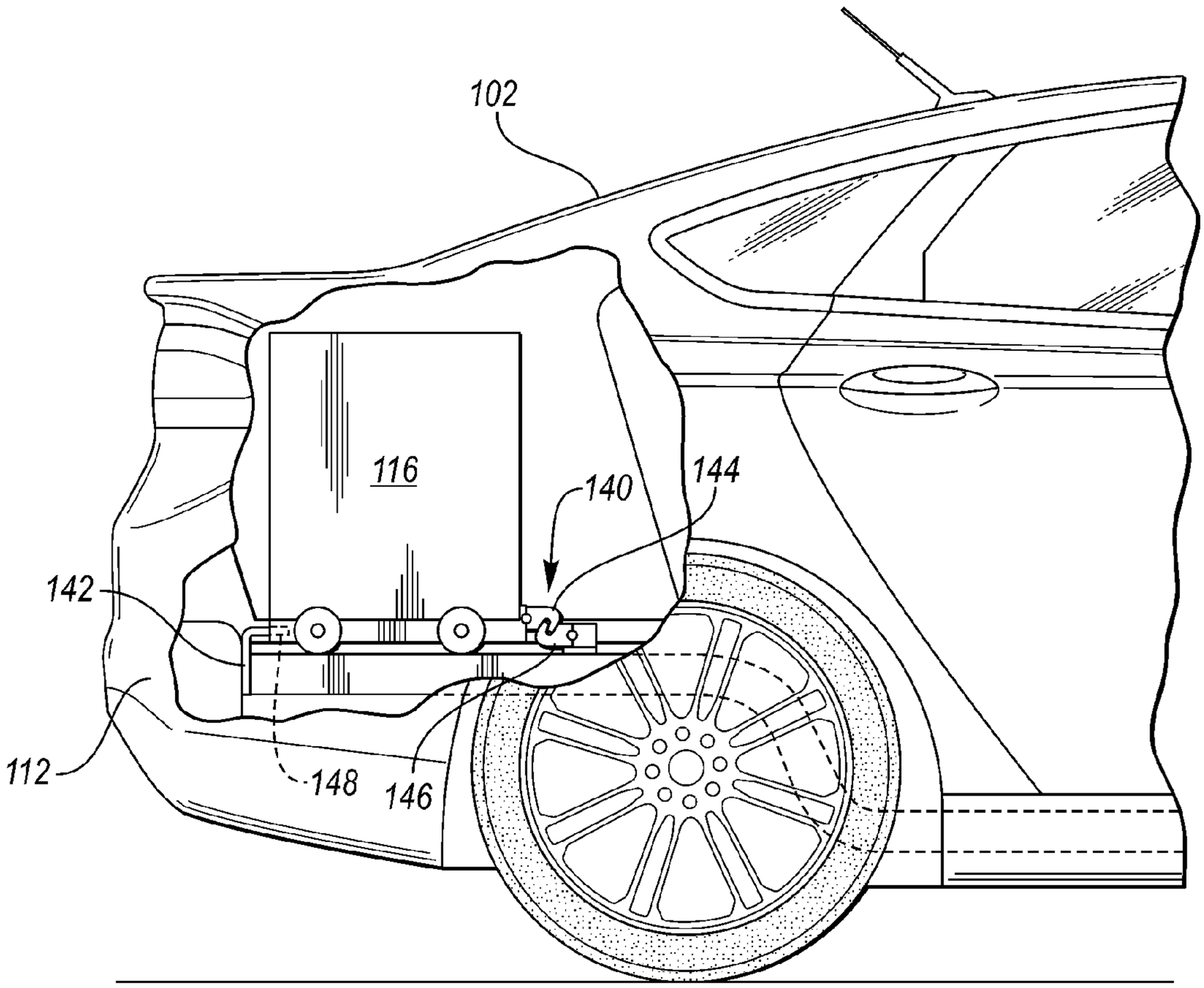

FIG. 7

MODULAR TRUNK SYSTEM

TECHNICAL FIELD

This disclosure relates to modular trunk systems.

BACKGROUND

Drivers often store items recently purchased within a trunk of their vehicle. Carrying around purchases, including shopping and supermarket bags, can be exhausting and can present a challenge for elderly and disabled people. Often times, several trips to the vehicle are needed to fully load and unload the purchases. To avoid making multiple trips, drivers may use carts or wagons to carry purchases to and from the vehicle. However, such carts and wagons may be difficult to load and unload into the vehicle.

SUMMARY

A vehicle trunk storage system may include a vehicle trunk having a trunk floor defining an opening and a lip extending around the opening, and a cart including a compartment and a wheeled base, wherein the lip is configured to receive a bottom of the compartment of the cart within the trunk.

A removable vehicle trunk cart may include a compartment having a top and bottom, and a pair of extendable legs extending from the bottom of the compartment and connecting the compartment to a wheeled base, the legs configured to lower the base in an extended state and retract the base in a collapsed state.

A vehicle trunk storage system may include a vehicle trunk having a trunk floor defining an opening and a lip extending around the opening; and a cart including a compartment and a wheeled base, wherein the lip is configured to receive a bottom of the compartment of the cart within the trunk, wherein the cart includes a pair of extendable legs extending from the bottom of the compartment and connecting the compartment to the wheeled base.

BRIEF DESCRIPTION OF THE DRAWINGS

The embodiments of the present disclosure are pointed out with particularity in the appended claims. However, other features of the various embodiments will become more apparent and will be best understood by referring to the following detailed description in conjunction with the accompanying drawings in which:

FIG. **1** illustrates an example modular trunk system;

FIG. **2** illustrates an example cart for the modular trunk system;

FIG. **3** illustrates the modular trunk system in a first state;

FIG. **4** illustrates the modular trunk system in a second state;

FIG. **5** illustrates the modular trunk system in a third state;

FIG. **6** illustrates a trunk of the modular trunk system; and

FIG. **7** illustrates a cross sectional side view of the modular trunk system showing a set of locking mechanisms.

DETAILED DESCRIPTION

As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale; some features may be exaggerated or minimized to show details of particular components. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for teaching one skilled in the art to variously employ the present invention.

Oftentimes, loading and unloading items from a vehicle can be time consuming and exhausting for a user. To avoid making multiple trips between a vehicle and a destination (e.g., the user's home, the grocery store, etc.), users may make use of carts or wagons. However, when the loading or unloading is complete, the user may then be required to return the cart, or fold the cart and lift the cart itself into the vehicle. This may cause an inconvenience to the user and may not be physically possible for some users. Further, the folded cart may take up valuable space within the vehicle trunk, and loading it after the purchased items have been loaded into the trunk may damage the items.

Described herein is a modular trunk system for a vehicle trunk whereby at least one cart is arranged within the trunk of the vehicle. The cart may be removed from the trunk without requiring the user to lift the cart into the trunk. Instead, retractable wheels may be arranged so that the cart may be pushed directly into the trunk. The cart may similarly be pulled from the trunk, without requiring the user to unload the items within the cart, or to lift any portion of the cart.

FIG. **1** illustrates an example modular trunk system **100**. The system **100** may include a vehicle trunk **102** and at least one cart **106** configured to be arranged therein. In the example shown in FIG. **1**, a pair of carts **106** is shown. However, one or more carts, including three carts **106**, could be arranged within the vehicle trunk **102**. The vehicle trunk **102** may be accessible via a trunk door **108**, as well as via a pair of bumper doors **112**. The bumper doors **112** are described in more detail with respect to FIG. **3** below.

The cart **106** may be arranged within the vehicle trunk **102** such that the trunk door **108** may completely close when the cart **106** is arranged in the trunk **102**. The cart **106** may be configured to carry any number of items such as groceries, sporting equipment, trash, luggage, etc.

FIG. **2** illustrates the example cart **106** for the modular trunk system **100**. The cart **106** may include at least one compartment **116** configured to carry the various items. The compartment **116**, as shown by way of example in the figures, may include an open top to allow items to be placed within the compartment **116**. In another example, a portion of a side of the compartment **116** may be open. Furthermore, although not shown, the compartment **116** may include a lid configured to open to allow access to the storage area therein. The lid may close while the cart **106** is traveling within the trunk **102**.

While the compartment **116** is shown as forming a cubic shape in the figures, other shapes and dimensions may be used to form the compartment **116**. The compartment **116** may be dimensioned to fit within the vehicle trunk **102** and such dimensions may be specific to the vehicle make and model. The compartment **116** may be made of a plastic or polymer material allow for stability and rigidity while permitting the cart **106** to remain relatively lightweight.

A pair of legs **122** may extend from a bottom of the compartment **116** to connect the compartment **116** to a base **120**. The base **120** may be arranged under the compartment **116** and may have dimensions similar to the length and width of the compartment **116**. Two pairs of wheels **130** may be arranged on the base allowing the cart **106** to be easily movable in an extended state.

The legs **122** may include a first portion **122**A and a second portion **122**B configured to fit within the first portion **122**A. In the extended state, as shown in FIG. **2**, the second portion **122**B may be extended out of the first portion **122**A. In a collapsed state, the second portion **122**B may be arranged within the first portion **122**A. This is described in more detail below with respect to FIGS. **3** and **4**. Although two portions **122**A, **122**B are shown, multiple portions may be used to create a telescoping effect for collapsing and expanding the legs **122**. The legs **122** may include a locking mechanism such as a pin lock **124** configured to lock the legs **122** in a fixed position by preventing movement of the first portion **122**A and the second portion **122**B.

By allowing the legs **122** to be extendable and collapsible, the base **120** may be moveable with respect to the compartment **116**. In the collapsed state, the cart **106** may be arranged within the vehicle trunk **102**. In the expanded state, where the base has been lowered away from the compartment **116**, the cart **106** may be removed from the trunk **102** to be used during shopping, etc.

FIG. **3** illustrates the modular trunk system in a first state where the bumper doors **112** and the trunk door **108** are open. The bumper doors **112** may be hinged at each exterior side thereof allowing the doors **112** to open in the center of the bumper. In the first state, or the stored or collapsed state, the cart **106** is arranged within the vehicle trunk **102**. A bottom **118** of the compartment **116** of the cart **106** may form part of a floor of the trunk **102**. That is, the bottom **118** separates the trunk **102** from the exterior road surface. The base **120** may be suspended just below the bottom **118** of the compartment **116** when the cart is stored within the trunk **102**.

FIG. **4** illustrates the modular trunk system **100** in a second state where the cart **106** is in an extended state. In the extended state, as explained above with respect to FIG. **2**, the legs **122** of the cart **106** may be extended so that the base **120** may be lowered. In the example described herein, the legs **122** may be extended by removing the locking mechanism **124** and allowing the first portion **122**A to slide out of the second portion **122**B. The locking mechanism **124** may then be returned to prevent the legs **122** from collapsing during use. Once the base is fully lowered, the wheels **130** on the base **120** may come into contact with the ground.

FIG. **5** illustrates the modular trunk system **100** in a third state where the cart **106** is in a removable extended state to be removed from the vehicle trunk **102** and configured to be used for shopping, etc. That is, once the legs **122** of the cart **106** have been extended and the base **120** lowered to the ground, the user may pull the cart **106** out of the trunk without lifting, or otherwise manipulating, the cart. Due to the bumper doors **112** opening at the center of the bumper, the cart **106** may be easily slid from the trunk **102**. Additionally, the cart **106** may be easily returned to the trunk **102**, by reversing the removal steps. Although not shown, the bumper doors **112** may include an internal multiple bolt locking mechanism configured to keep the doors **112** locked in place to keep the bumper functional during vehicle use. The bolt locking mechanism may hold the bumper together and maintain its functionality.

The trunk **102** may include a trunk floor **132** defining an opening **134** configured to receive the cart **106**. A lip **136** may be defined around the periphery of the opening **134**. As shown in FIGS. **3** and **4**, the lip **136** may be configured to receive a portion of the perimeter of the bottom **118** of the compartment **116** when the system **100** is in the first and second states as shown in FIGS. **3** and **4**. That is, the compartment **116** may rest on the lip **136** during the first and second states. The compartment **116** may fit securely within the trunk **102** so as to inhibit movement during vehicle use.

Although not shown, various locking mechanisms may be implemented to further prevent the cart **106** from shifting during vehicle use. This is described in further detail with respect to FIG. **7** below. During the third state, the compartment **116** may be slid from the lip **136**.

The user may return the cart **106** to the vehicle trunk **102** after use by opening the bumper doors **112** and pushing the cart into the opening **134**. The bottom **118** of the compartment **116** may rest on the lip **136**. Once the cart **106** is arranged within the opening **134**, the user may remove the locking mechanism **124** from the legs **122** and push the base **120** upwards. Once the legs **122** are fully collapsed, the user may return the locking mechanism **124** to keep the legs **122** collapsed. Thus, the legs **122** may be collapsed while the cart **106** rests on the lip **136**, preventing any lifting of the cart and items therein by the user.

FIG. **6** illustrates the trunk **102** of the modular trunk system **100**. The trunk floor **132** may include a floor door **138** configured to cover the opening **134** when the cart **106** has been removed from the trunk **102**. The door **138** may be similar to a sun roof closure where the door **138** may slide along the lip **136** and cover the opening **134**. The door **138** may be motor driven, as well as manually slidable. The door **138** may rest on the lip **136** and prevent dirt, water, animals, etc., from entering the trunk **102** while the cart **106** is not stored within the trunk **102**.

FIG. **7** illustrates a cross sectional side view of the vehicle trunk **102** showing a set of locking mechanisms **140**, **142**. The first locking mechanism **140** may include a releasable latch mechanism **146** similar to a hook with a spring-loaded closable latch, configured to attach with an eye **144** arranged on a rear of the cart **106**. The latch mechanism **146** may connect and attach with the eye **144** upon force being applied thereto. That is, when the cart **106** is pushed into the trunk **102**, the eye **144** may apply pressure to the closable latch of the latch mechanism and open the latch so that the latch mechanism may attach with the eye **144**. The latch mechanism **146** may release the eye **146** upon the cart **106** being pulled away from the latch mechanism **146** with a certain amount of force. That is, while the latch mechanism **146** may engage with the eye **144** to prevent the cart **106** from shifting significantly during transport, the latch mechanism **146** may release upon realizing a certain amount of force. The latch mechanism **146** may be manually released as well by the user manually unlatching the latch mechanism **146** from the eye **144**.

The second locking mechanism **142** may be arranged on an inside fascia of the bumper **112**. The second locking mechanism **142** may be configured to abut the cart **106** when the bumper **112** is in a closed position in order to maintain the cart **106** in a fixed position within the trunk. The second locking mechanism **142** may include a hook and closable latch system similar to the one described above with respect to the first locking mechanism **140**. Additionally or alternatively, the second locking mechanism **142** may include a projection **148** configured to be received by a recess defined by the cart **106** (not separately labeled).

Accordingly, a modular trunk system may be configured to allow a cart to be easily stored and removed from a vehicle trunk without requiring any lifting or folding by the user. Objects within the compartment of the cart may remain therein without the need to load and unload the items from the trunk, creating efficient and easy transport of the items between stores, homes, etc. Furthermore, the base of the cart may form the bottom of the vehicle trunk. The cart may

include a pair of expandable legs, allowing the cart to be easily adaptable to fit within the trunk and to be used outside of the vehicle, all while allowing the cart to easily slide back into place in the trunk after use.

While exemplary embodiments are described above, it is not intended that these embodiments describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. Additionally, the features of various implementing embodiments may be combined to form further embodiments of the invention.

What is claimed is:

1. A vehicle trunk storage system, comprising:

a vehicle trunk having a trunk floor defining an opening and a lip extending around the opening; and

a cart including a compartment and a wheeled base, wherein the lip is configured to receive a bottom of the compartment of the cart within the trunk, wherein the cart includes a pair of extendable legs extending from the bottom of the compartment and connecting the compartment to the wheeled base, the legs configured to lower the base in an extended state and retract the base in a collapsed state.

2. The system of claim **1**, wherein the legs include a first portion and a second portion configured to fit within the first portion.

3. The system of claim **1**, further comprising a pair of bumper doors configured to open to the vehicle trunk, wherein the cart, in an extended state, is configured to be removed from the trunk through the bumper doors.

4. The system of claim **3**, further comprising a floor door configured to cover the opening of the trunk floor, wherein the floor door completes the trunk floor when the cart is in the extended state and external to the vehicle and wherein the bottom of the compartment of the cart completes the trunk floor when the cart is in a collapsed state within the vehicle trunk.

5. The system of claim **1**, wherein the wheeled based includes a pair of wheels.

6. The system of claim **1**, wherein the cart includes a pair of carts.

7. A vehicle trunk storage system, comprising:

a vehicle trunk having a trunk floor defining an opening and a lip extending around the opening; and

a cart including a compartment and a wheeled base, wherein the lip is configured to receive a bottom of the compartment of the cart within the trunk, wherein the cart includes a pair of extendable legs extending from the bottom of the compartment and connecting the compartment to the wheeled base.

8. The system of claim **7**, wherein the legs include a first portion and a second portion configured to fit within the first portion and wherein the legs are configured to lower the base in an extended state and retract the base in a collapsed state.

9. The system of claim **7**, further comprising a pair of bumper doors configured to open to the vehicle trunk, wherein the cart, in an extended state, is configured to be removed from the trunk through the bumper doors.

10. The system of claim **9**, further comprising a floor door configured to cover the opening of the trunk floor, wherein the floor door completes the trunk floor when the cart is in the extended state and external to the vehicle and wherein the bottom of the compartment of the cart completes the trunk floor when the cart is in a collapsed state within the vehicle trunk.

* * * * *